are asked to consider a judge who sentences people with Afrocentric features more severely (without being aware of this bias) because he perceives them as less intelligent. Yet this time, any conscious justification given by judges cannot be the same as the "proximal" cue, since the judges in these cases would presumably not rationalize their decisions in terms of any aspect of the suspects' appearance whatsoever: They would simply not be aware that the perception of a face as either Afrocentric or unintelligent would influence their judgment. In such cases there is clearly a disconnect between the conscious justification made by an agent and causes of their behavior. In this context, it is interesting that a recent mock-jury study found that when given a chance to deliberate, jurors were more likely to find an attractive defendant guilty, whereas without deliberation they were more likely to find a non-attractive defendant guilty (Patry 2008). This finding is in accord with a more dynamic picture of the unconscious than the one that N&S paint.

Finally, N&S omit any discussion of the extensive developmental literature on the ontogeny of children's decision making. Yet that literature is highly relevant to the conceptual limitations of their article, in that there are many experimental tasks (reviewed by Karmiloff-Smith 1992) for which younger children are unable to articulate why they have a preference for a particular behavioral choice, but for which older children are able to explain the conscious reasoning behind their choices. Because of this type of transition, developmental research currently represents a growing point in dual-process accounts of decision making (e.g., Stanovich et al. 2011). Taking a developmental perspective leads us again to emphasize the dynamic relationship between conscious and unconscious influences on decision making, because observing how children solve certain tasks makes it clear that conscious thought processes can come to modulate decision making that was previously performed automatically.

Why decision making may not require awareness

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I. P. L. McLaren, B. D. Dunn, N. S. Lawrence, F. N. Milton, F. Verbruggen, T. Stevens, A. McAndrew, and F. Yeates

Washington Singer Laboratories, School of Psychology, University of Exeter, Exeter EX4 4QG, United Kingdom.

i.p.l.mclaren@exeter.ac.uk B.D.Dunn@exeter.ac.uk
Natalia.Lawrence@exeter.ac.uk f.n.milton@ex.ac.uk
F.L.J.Verbruggen@exeter.ac.uk t.stevens@ex.ac.uk
am375@exeter.ac.uk fy212@exeter.ac.uk

Abstract: Newell & Shanks (N&S) argue against the idea that any significant role for unconscious influences on decision making has been established by research to date. Inasmuch as this conclusion applies to the idea of an "intelligent cognitive unconscious," we would agree. Our concern is that the article could lead the unwary to conclude that there are no unconscious influences on decision making – and never could be. We give reasons why this may not be the case.

We begin by raising some general methodological issues regarding the assessment of insight, and then we move to considering other examples from our own work that also bear on the thesis of the article. The first methodological issue we wish to raise regards the possible knock on effects of measuring insight in the stringent way that Newell & Shanks (N&S) recommend. Although we agree that the immediacy criterion is well-motivated in principle, the concurrent measurement of awareness with performance could predispose participants to use a conscious decision strategy in a situation where they may otherwise use an unconscious strategy. Indeed, this criterion seems fundamentally at odds with N&S's recommendation that highly reflective situations should be avoided in the study of unconscious decision making. The authors argue that online judgments do not alter judgment strategies by citing a study which showed that the inclusion of an online awareness measure made no difference to performance (Lagnado et al. 2006), but in reaching this conclusion N&S are relying on a null result (an approach they criticise when it provides evidence in support of unconscious processes). Furthermore, the absence of performance differences does not rule out the possibility that different processing strategies are being used to obtain a similar level of performance in the two versions of the task.

The second methodological issue pertains to the narrative rather than the systematic review approach that appears to have been adopted in the article. We agree with N&S that a focus on particular influential domains in such a review is entirely appropriate, but we feel that a systematic search strategy for identifying studies in each domain should have been articulated. For example, work we have conducted has found some evidence for unconscious influences on a variant of the Iowa Gambling Task (IGT) (Dunn et al. 2011) that we feel offers some support for the unconscious account and would have been relevant here. In particular, using the stringent insight criterion outlined by Maia and McClelland (2004) that meet the reliability, relevance, immediacy, and sensitivity criteria, we found that participants behaviourally acquired a modified IGT task prior to being able to articulate conscious awareness. Although the methodology of this study can also be criticised (on the basis of low power), this nevertheless is some evidence for unconscious decision-making influences. Therefore, the review can be critiqued on the grounds that its coverage of each domain is in parts selective.

The third methodological issue is that the insight literature has generally neglected a potentially prominent role for individual differences – namely, that individuals' performance may be more or less driven by unconscious influences. Consistent with this position, verbal reports indicate that the degree to which performance on the IGT is driven by conscious awareness varies between individuals (e.g., Guillaume et al. 2009, although we acknowledge the limitations of the way awareness was indexed in this study). Similarly, individual differences exist in the extent to which anticipatory bodily signals (arguably a measure of unconscious influence) are associated with task acquisition on the IGT and its variants (Dunn et al. 2011; Guillaume et al. 2009).

If marked individual differences do exist, this means that attempts to characterise behaviour at the population level are likely to be doomed to failure. In other words, the question should shift from "is behaviour driven by unconscious influences?" to "in which individuals and contexts is behaviour most driven by unconscious influences?"

Turning now to examples taken from our own research that are also relevant to this debate, our position is that there are other types of unconscious influence on decision making, in particular the influence of automatic, associative processes on behaviour. The case is slightly complicated by the fact that associative processes do not have to proceed in the absence of awareness, but equally they do not require it either (McLaren et al. 1994), which immediately raises the possibility that there can be instances of unconscious influences on decision making involving processing of this type. We will focus on the demonstrations of peak-shift in humans by Jones and McLaren (1999) and Livesey and McLaren (2009), though we could equally appeal to demonstrations of implicit sequence learning by Jones and McLaren (2009) and Spiegel and McLaren (2006), which make the point that the decisions made by participants are quite different when they are aware (a monotonic function consistent with rule use) or unaware (a non-monotonic function consistent with peak-shift) of the contingencies in play. Participants had to classify green squares by pressing one of two keys. The participants were not informed that the squares varied in either brightness (1999) or hue (2009), and so the correct response had to be learned by trial and error (they were given feedback). During a subsequent test phase (without feedback) they were shown

stimuli that varied over a much wider range of brightness or hue. At this point those participants that were unable to specify that the correct attribute to guide their decisions exhibited the typical "peak-shift" pattern of responding seen in similar experiments with pigeons (e.g., Hanson 1957). Other participants who became aware of the attributes relevant to responding (either during training or testing) showed a different pattern, with performance improving monotonically as they moved from the training stimuli to more extreme values.

The awareness test used in this experiment clearly fails the sensitivity criterion that the authors would apply, and yet our point is that there is actually a strong case to be made for this being an example of unconscious influences on decision making. The key here is the correlation between verbal report and the pattern of performance. If participants say they are aware of the critical attribute's role in the task, then they show one pattern. If they are not aware of it, then they show a different pattern similar to that seen in pigeons. N&S may still argue that both patterns of performance are due to conscious cognitive processes; however, this would lead to an entirely new interpretation of peak-shift in pigeons. If the explanation in terms of conscious cognitive processes is taken to apply only to humans, then we must ask why such an unparsimonious position is being adopted, with one explanation for humans and another for infra-humans. Either way, this type of evidence poses a considerable challenge for the analysis offered in this article.

Better tests of consciousness are needed, but skepticism about unconscious processes is unwarranted

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Ryan Ogilvie and Peter Carruthers

Department of Philosophy, University of Maryland, College Park, MD 20742.

rogilvie@umd.edu **pcarruth@umd.edu**

http://www.philosophy.umd.edu/Faculty/pcarruthers/

Abstract: What people report is, at times, the best evidence we have for what they experience. Newell & Shanks (N&S) do a service for debates regarding the role of unconscious influences on decision making by offering some sound methodological recommendations. We doubt, however, that those recommendations go far enough. For even if people have knowledge of the factors that influence their decisions, it does not follow that such knowledge is conscious, and plays a causal role, at the time the decision is made. Moreover, N&S fail to demonstrate that unconscious thought plays no role at all in decision making. Indeed, such a claim is quite implausible. In making these points we comment on their discussion of the literature on expertise acquisition and the Iowa Gambling Task.

Newell & Shanks (N&S) argue that there is little reason to think that unconscious thought plays a significant role in decision making. But they cast their net of evidence too narrowly. In particular, we worry that the research they marshal in support of their claim is either (a) consistent with competing interpretations that are supported by other lines of research or (b) fails to show that all elements that go into reaching a decision are conscious. While the data that N&S cite show that we have more knowledge of the factors that underwrite our decisions than was previously thought, they do not show that this knowledge informs our decisions or is conscious at the time the decision is made.

To begin, many of the studies that N&S cite demonstrate that, at best, people have *post facto* knowledge of the factors that figure in their decision making, not that those factors are conscious during the decision-making process itself. Consider, for example, N&S's discussion of studies of expert decision making that purport to find a discrepancy between explicit and implicit policies, or between explicit and implicit knowledge of the environmental cues that influence one's decisions. Previous studies had asked people to estimate their reliance on each cue, finding little correlation between those judgments and actual decision-making practice, thus suggesting that their reliance on those cues was unconscious. But if people are presented, instead, with a variety of sets of cue weightings and are asked to select which most closely resembles the strategy they use, then they prove quite accurate. N&S take this to show that people follow a conscious decision strategy. However, that one has a capacity to *recognize* one's policy does not begin to show that one consciously employs that policy. For the display may trigger an *implicit* memory of the previously deployed, but an unconscious decision strategy, which then primes the person's selection. One reason to prefer this explanation is that it is a familiar finding in the perception literature that masked stimuli produce implicit memories, which can then modify behavior in future tasks (Leuthold & Kopp 1998; Schacter 1992).

Of course, we grant that this hardly settles the matter and that further experimentation is required. In agreement with N&S's "immediacy" criterion, we suggest that what is needed in this type of case is *introspection sampling*, where people are cued at irregular intervals to report the contents of their conscious awareness (Hurlburt & Akhter 2006). Post facto measurements of conscious awareness not only run the risk of participants tapping into implicit memories or accessing knowledge that played no active part in the decision-making process, but they also run the risk of participants forgetting what they had in fact been conscious of.

Similar points hold in connection with N&S's discussion of the Iowa Gambling Task. They point out that when Maia and McClelland (2004) use a more explicit and less open-ended set of probe questions than had previously been employed, people show awareness of which decks are the good ones, and of the approximate long-term payoffs of the decks, as soon as they start to choose appropriately. N&S take this to show that it is conscious knowledge of payoffs that drives people's choices. Yet it may be (as Maia & McClelland themselves note) that in their online selections people rely on their affective responses toward the various options, without conscious judgments of relative goodness or approximate payoffs playing any causal role in the process. Indeed, when asked, people may base their judgments of goodness on their concurrent affective reaction while they contemplate making a selection from each deck. Moreover, they may either be able to reconstruct a rough estimate of the payoffs of each deck from memory, or else they may have constructed such a model in an ongoing manner following each trial.

Not only is this alternative construal of the data possible, but it is preferable. For it can smoothly accommodate the findings from patients with damage to ventromedial prefrontal cortex (VMPFC) (which is widely accepted to be the primary site of cortical representations of affect; Rolls 1999). Such patients continue to make bad choices in the Iowa Gambling Task, despite having good knowledge of the expected payoffs from each deck (Bechara et al. 2000). This finding makes good sense if people base their selections on their affective responses (which are absent or attenuated in VMPFC patients) while at the same time building a conceptual model of the task contingencies. To accommodate these data N&S will need to claim that in the normal case it is conscious judgments of comparative goodness that drive one's affective reactions. We know, however, that affective responses occur quite swiftly. It is implausible to claim that in every case they are preceded by conscious conceptual appraisals of the situation.

Even if we set aside these concerns about N&S's treatment of the data, however, they will need to posit some mechanism that can maintain an approximate running total of the net winnings from each deck. Otherwise the judgments of comparative goodness and likely payoffs from each deck that they appeal to will appear magical. But it is quite implausible that participants are aware of calculating these approximate running totals during the gambling task, in the way that one might be aware of calculating